

What is claimed is:

1. An input / output signaling apparatus, comprising:

a low voltage input stage that receives low voltage core input signals;

5 an output stage that provides a higher voltage external output based on the low voltage core input signals; and

a cascode stage coupled between the low voltage input stage and the output stage that provides a bias to the output stage and provides a limit for preventing breakdown in the low voltage input stage.

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2. The input / output signaling apparatus of claim 1, further comprising:

a feedback device coupled to the output stage that prevents static current after a change in value of the external output.

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3. The input / output signaling apparatus of claim 2, further comprising:

a keeper device that maintains the changed value of the external output based on operation of the feedback device.

4. The input / output signaling apparatus of claim 1, wherein a range of the low voltage  
20 core input signals is limited to between approximately 0 volts and 1 volt.

5. The input / output signaling apparatus of claim 1, wherein a range of the higher voltage external output can exceed a range of the low voltage core input signals by a factor of approximately three.

5        6. The input / output signaling apparatus of claim 4, wherein a range of the higher voltage external output can exceed the range of the low voltage core input signals by a factor of approximately three.

7. The input / output signaling apparatus of claim 6, wherein the range of the higher  
10 voltage external output is between approximately 0 volt and 3.3 volts.

8. The input / output signaling apparatus of claim 1, wherein the low voltage input stage is comprised of a pair of low-voltage transistors having gates respectively coupled to a pair of differential signals corresponding to the low voltage core input signals.

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9. The input / output signaling apparatus of claim 1, wherein the output stage is a current mirror comprised of a pair of transistors having threshold voltages in accordance with the higher voltage external output.

20        10. The input / output signaling apparatus of claim 9, wherein the cascode stage is comprised of a pair of transistors having threshold voltages approximately the same as the threshold voltages of the current mirror transistors.

11. The input / output signaling apparatus of claim 1, wherein the low voltage input stage is comprised of a first pair of low-voltage transistors having gates respectively coupled to a pair of differential signals corresponding to the low voltage core input signals, and

wherein the output stage is a current mirror comprised of a second pair of transistors  
5 having threshold voltages in accordance with the higher voltage external output, and

wherein the cascode stage is comprised of a third pair of transistors having threshold voltages approximately the same as the threshold voltages of the current mirror transistors.

12. The input / output signaling apparatus of claim 7, wherein the low voltage input stage  
10 is comprised of a pair of low-voltage transistors having gates respectively coupled to a pair of differential signals corresponding to the low voltage core input signals.

13. The input / output signaling apparatus of claim 7, wherein the output stage is a current mirror comprised of a pair of transistors having threshold voltages in accordance with the  
15 higher voltage external output.

14. The input / output signaling apparatus of claim 13, wherein the cascode stage is comprised of a pair of transistors having threshold voltages approximately the same as the threshold voltages of the current mirror transistors.

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15. The input / output signaling apparatus of claim 7, wherein the low voltage input stage is comprised of a first pair of low-voltage transistors having gates respectively coupled to a pair of differential signals corresponding to the low voltage core input signals, and

wherein the output stage is a current mirror comprised of a second pair of transistors  
5 having threshold voltages in accordance with the higher voltage external output, and

wherein the cascode stage is comprised of a third pair of transistors having threshold voltages approximately the same as the threshold voltages of the current mirror transistors.

16. An input / output signaling apparatus, comprising:

10 a low voltage input stage that receives low voltage core input signals;  
an output stage that provides a higher voltage external output based on the low voltage core input signals; and

a cascode stage coupled between the low voltage input stage and the output stage that provides a bias to the output stage; and

15 a feedback device coupled to the output stage.

17. The input / output signaling apparatus of claim 16, further comprising:

a keeper device that maintains the changed value of the external output based on operation of the feedback device.

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18. The input / output signaling apparatus of claim 16, wherein a range of the low voltage core input signals is limited to between approximately 0 volts and 1 volt.

19. The input / output signaling apparatus of claim 16, wherein a range of the higher voltage external output can exceed a range of the low voltage core input signals by a factor of approximately three.

5        20. The input / output signaling apparatus of claim 18, wherein a range of the higher voltage external output can exceed the range of the low voltage core input signals by a factor of approximately three.

21. The input / output signaling apparatus of claim 20, wherein the range of the higher  
10 voltage external output is between approximately 0 volt and 3.3 volts.

22. The input / output signaling apparatus of claim 16, wherein the bias provided to the output stage provides a limit for preventing breakdown in the low voltage input stage.

15        23. The input / output signaling apparatus of claim 16, wherein the feedback device prevents static current after a change in value of the external output.